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SOVEREIGN CREDIT RATINGS?

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Do institutions mitigate the uncertainty effect on sovereign credit ratings?*

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Abstract

In a more integrated economic and financial world, sovereign credit ratings have become one of the most important factors for countries that seek to access funds in the international bond market. First, we jointly analyzed institutions and uncertainty as determinants of sovereign credit ratings, and second, we tested whether strong institutions soften the impact of uncertainty. Using a sample of 74 countries from 2003 to 2020 for the major agencies Moody's, Standard & Poor's, and Fitch, and employing an ordered estimator approach, we find that institutions have a positive effect, whereas uncertainty has a negative effect, and the interaction between them is systematically negative. These results indicate that strong institutions reduce the negative effect of uncertainty on sovereign credit ratings.

JEL Classification: G24, H81, C23

Keywords: Credit rating, institutions, uncertainty, panel data.

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¿Mitigan las instituciones el efecto de la incertidumbre sobre la calificación de crédito soberano?*

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Resumen

En un mundo económico y financiero cada vez más integrado, las calificaciones crediticias soberanas se han convertido en uno de los factores más importantes para los países que buscan acceder a fondos en el mercado internacional de bonos. En primer lugar, analizamos conjuntamente las instituciones y la incertidumbre como determinantes de las calificaciones crediticias soberanas y, en segundo lugar, comprobamos si las instituciones fuertes suavizan el impacto de la incertidumbre. Utilizando una muestra de 74 países de 2003 a 2020 para las principales agencias Moody's, Standard&Poor's, y Fitch, y empleando un enfoque de estimadores ordenados, encontramos que las instituciones tienen un efecto positivo, mientras que la incertidumbre tiene un efecto negativo, y la interacción entre ellos es sistemáticamente negativa. Estos resultados indican que unas instituciones fuertes reducen el efecto negativo de la incertidumbre en las calificaciones crediticias de los países.

JEL Classification: G24, H81, C23

Keywords: Credit rating, institutions, uncertainty, panel data.

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1. Introduction

Sovereign credit ratings provide relevant information on the creditworthiness of a country, and thereby serve as a tool for investors to make appropriate decisions on investments in financial assets. Therefore, the determination of a country's credit rating is a rather complex activity involving variables of different dimensions, carried out by specialized agencies. As a result, the determinants of sovereign credit ratings have attracted the attention of researchers in recent years; several studies have tried to identify and model these factors from different points of view.

An initial strand of the literature analyzes the effects of macroeconomic variables; for instance, [Cantor and Packer \(1996\)](#), using a linear regression on a dependent variable that had a logistic transformation, evaluated the determinants of the sovereign credit ratings of Moody's and Standard Poor's. Using a worldwide dataset for 1995, they found that GDP growth and GDP per capita have significant positive coefficients, while inflation, default history, and external debt have the opposite effect. In turn, [Afonso \(2003\)](#) obtained similar results for a set of countries in 2001. While, [Bissoondoyal-Bheenick \(2005\)](#), by using an ordered response model with a country panel data, finds that GDP per capita and inflation are the most important factors.

A second strand of studies highlights the role of institutional factors. [Altenkirch \(2005\)](#) and [Archer *et al.* \(2007\)](#) found that political factors have little effect on credit ratings in a worldwide panel data set. On the contrary, [Afonso *et al.* \(2011\)](#) detected that the government effectiveness as a measure of institutions has a long-run impact. In like manner, [Biglaiser and Staats \(2012\)](#) showed that the rule of law, strong courts, and the protection of property rights positively affect sovereign credit ratings; while [Osobajo and Akintunde \(2019\)](#) discovered that the most important determinant is the institutional variable. Rather than political institutions, [Boumparis *et al.* \(2017\)](#) utilized a regulatory quality index that is composed, among other things, of financial institutions; and find a positive effect.

In turn, there is a growing literature that stresses the importance of uncertainty on the real side of an economy, and on financial and credit market conditions. On the real side, uncertainty causes a partial irreversibility of investments by increasing the real option value of postponing non-reversible investment as well as increasing precautionary saving ([Bloom *et al.*, 2018](#)). As regards financial and credit market conditions, [Rehse *et al.* \(2019\)](#) presented evidence that periods of higher uncertainty are associated with lower asset trading volume; while [Bordo *et al.* \(2016\)](#) determined that uncertainty has detrimental effects on market functioning since it hurts credit growth.

Nonetheless, little attention has been paid to the role of uncertainty on sovereign credit rating. [Boumparis *et al.* \(2017\)](#) found that the aggregate (average) Eurozone economic policy uncertainty impacts negatively on credit ratings across the quantile distribution in Eurozone countries. Meanwhile, [Hantzsche \(2018\)](#) constructed an uncertainty fiscal index to show that credit rating agencies take fiscal uncertainty as an important determinant of sovereign credit ratings for OECD countries. In a related study at the firm level, [Attig *et al.* \(2021\)](#) revealed that increased policy uncertainty is associated with weaker rating standards among US firms.

Unlike the aforementioned studies, first, we jointly analyze political institutions and uncertainty as determinants of sovereign credit ratings, using country-specific economic policy uncertainty instead of aggregate uncertainty. Second but more importantly, we test whether strong institutions alleviate uncertainty through the key role they play in softening the impact of uncertainty by promoting stability and thus investment and innovation. Finally, in line with recent literature, we use random-effects ordered probit and logit models, which overcome the problems of linear models when the dependent variable is ordinal.

By using a worldwide sample of 74 countries from 2003 to 2020 for the most important agencies (Moody's, Standard & Poor's, and Fitch), we find, in line with previous literature, that institutions have a positive effect while economic policy uncertainty has a negative one. Most importantly, we find that the interaction between institutions and uncertainty is consistently negative. These results mean that strong institutions will decrease the significant negative effect of uncertainty on sovereign credit ratings. We organize the paper as follows: beside this introduction, section 2 discusses data, variable definitions and the estimation methodology; Section 3 discusses results from the random-effects ordered probit and logit models; and Section 4 concludes.

2. Data and methodology

2.1. Methodology

The estimation methodology draws on [Bissoondoyal-Bheenick \(2005\)](#), who proposed a random-effect ordered logit and probit response models for panel data. These models have advantages over others that have been used in the literature. First, ordered response models overcome the criticisms of linear models regarding the ordinal nature of the ratings. Second, they overcome the assumption that the variation between rating categories is the same for all, by allowing a derivative for each rating to be obtained

(Afonso *et al.*, 2011).

Therefore, we specify the following equation:

$$R_{it} = f(\mu_i + \beta' X_{it} + \epsilon_{it}), \quad (1)$$

where R_{it} is the dependent variable and has different cut-off points, since this model follows the ordinal characteristic of the sovereign credit rating; μ_i is the individual specific effect, X_{it} are a set of explanatory variables and may also include lagged and interaction variables; f represents the parametric probit or logit function; i indexes countries, and t indexes time periods (years); and ϵ_{it} represents the error term.

2.2. Data

Our study period of study spans 2003 to 2020 for a sample of 70, 69, and 66 countries for Moody's, Standard & Poor's, and Fitch, respectively. Table 1 shows the definitions of sources and variable used for estimating (1), where data availability dictates the length of time and the country coverage. Following Cantor and Packer (1996) and Afonso *et al.* (2011), the rating variable is constructed as 1 for high-risk speculative grade, 2 to 7 for speculative grade, and 8 to 17 for investment grade. Summary statistics of the variables used in the empirical part are detailed in Table 2.

Although there is no consensus in the literature about a single definition of political institutions, we use the Worldwide Governance Indicators developed by the World Bank; which defines them as the traditions and institutions by which authority in a country is exercised, including government selection and monitoring process, the capacity of the government to effectively formulate and implement sound policies, and the state for the economic and social institutions. This indicator has the advantage of encompassing different notions of governance ranging from the most general to the most specific (see Kaufmann *et al.*, 2017).

For the uncertainly variable, we use data from the World Uncertainty Index constructed by Ahir *et al.* (2018), for 143 countries from 1996 onwards, which has not previously been used in this literature to our knowledge. The data is constructed using frequency counts of "uncertainty" in the quarterly Economist Intelligence Unit country reports; these reports discuss major political and economic developments in each country, along with analysis and forecasts of political, policy and economic conditions (Ahir *et al.*, 2018). The data have the advantage of being comparable between countries, since they come from the same source and the same methodology.

It is worth noting that the variables used enter the regressions in a lagged form,

except for the case of uncertainty. This, in part, is because rating agencies, when evaluating a country, have access to lagged rather than contemporaneous information on macroeconomic and institutional variables. This is not the case for uncertainty, which, by its nature, can be perceived in real time. More importantly, using a lagged form of the independent variables reduces possible endogeneity problems arising from a correlation between some control variables and the error term. These problems are common in economic models, since there is a possible contemporaneous double causality between the dependent variable and its determinants.

Table 1: Data sources and variable definition

Variable	Definition	Source
Sovereign credit rating	Sovereign credit rating provided by Moody's, Standard & Poor's, and Fitch.	Bloomberg
Real GDP growth	Percentage change of real GDP.	IMF Data
Real per capita GDP	Log GDP per capita, US dollars, constant 2005 prices.	World Bank Data
Inflation	Percentage change of consumer price index.	World Bank Data
Government expenditure	Government expenditure as a percentage of GDP, in logs.	IMF Data
Government debt	Government debt as a percentage of GDP, in logs.	IMF Data
Current account balance	Current account balance as a percentage of GDP.	IMF Data
Reserves	Reserves as a percentage of GDP, in logs.	World Bank Data
Default	Dummy that indicates existence of sovereign default.	Moody's
Institutions	Average of the World Governance Indicators.	World Bank Data
Control of corruption	Perceptions of the extent to which public power is exercised for private gain.	World Bank Data
Government effectiveness	Perceptions of the quality of public services.	World Bank Data
Political stability	Perceptions of the likelihood of political instability and/or politically-motivated violence.	World Bank Data
Rule of law	Perceptions of the extent to which agents have confidence in and abide by the rules of society.	World Bank Data
Regulatory quality	Perceptions of the ability of the government to formulate and implement sound policies and regulations.	World Bank Data
Voice and Accountability	Perceptions of the extent to which a country's citizens participate in selecting their government and freedom of expression.	World Bank Data
Uncertainty	World Uncertainty Index.	Ahir et al. (2018)

Table 2: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Standard & Poor's Rating	1178	9.99	5.09	1.00	17.00
Moody's Rating	1148	10.15	5.24	1.00	17.00
Fitch Rating	1087	10.18	4.89	1.00	17.00
Real GDP growth (%)	1178	3.42	3.41	-14.8	28.1
Real per capita GDP	1178	933.3	116.7	668.1	1139.0
Inflation (%)	1178	4.04	4.57	-4.86	51.46
Government expenditure (% of GDP)	1178	3.46	0.36	2.20	4.17
Government debt (% of GDP)	1178	3.78	0.86	-2.96	5.46
Current account balance (% of GDP)	1178	-0.58	6.82	-43.83	33.19
Reserves (% of GDP)	1178	2.39	1.19	-1.88	5.11
Default (Dummy)	1178	0.01	0.08	0.00	1.00
Institutions (index)	1178	0.45	0.85	-1.18	1.97
Control of corruption (index)	1178	0.44	1.06	-1.39	2.47
Government effectiveness (index)	1178	0.58	0.90	-1.07	2.44
Political stability (index)	1178	0.15	0.89	-2.81	1.76
Rule of law (index)	1178	0.47	0.97	-1.25	2.12
Regulatory quality (index)	1178	0.62	0.83	-1.30	2.26
Voice and accountability (index)	1178	0.45	0.83	-1.75	1.78
Uncertainty (index)	1178	0.20	0.16	0.00	1.34

3. Estimation and inference results

Table 3 presents the results of the random-effects ordered probit and logit models for the three main rating agencies: Moody's, Standard & Poor's, and Fitch. The results suggest that, in all cases, the political institutions variable has a significant and positive effect on sovereign credit ratings, in line with previous research findings, while the uncertainty indicator has an opposite effect. More importantly, the interaction between them is systematically negative. These results suggest that strong institutions reduce the negative impact of uncertainty on sovereign credit ratings.

Intuitively, uncertainty indicators capture the risk of the government acting opportunistically with respect to investors. Thus, if uncertainty is higher, the level of private investment will be lower. Instead, strong political institutions can enable the government to credibly commit itself to not engage in ex-post opportunistic behavior towards private investors—in addition to formulating and implementing sound policies and reg-

ulations that enable and promote private sector development (North and Weingast, 2019; Rodrik, 1991; Le, 2004).

Table 3: Estimation results

Dependent variable: Sovereign credit rating	Moody's		Standard & Poor's		Fitch	
	RE Probit	RE Logit	RE Probit	RE Logit	RE Probit	RE Logit
Uncertainty	-0.82**	-1.33**	-1.09***	-1.71***	-1.01***	-1.72***
Economic Policy Uncertainty Index (EPU)	(0.34)	(0.614)	(0.349)	(0.653)	(0.278)	(0.534)
Institutions	4.01***	7.20***	3.98***	7.025***	4.38***	7.65***
Average of the World Governance Indicators	(0.701)	(1.331)	(0.626)	(1.291)	(0.639)	(1.196)
Uncertainty×Institutions	-0.91*	-1.53*	-1.20**	-2.34**	-0.89*	-1.50**
Interaction EPU and Governance indicators	(0.50)	(0.89)	(0.502)	(0.969)	(0.518)	(0.906)
Real GDP growth	0.015	0.003	0.04*	0.056	0.03*	0.04*
Percentage change of real GDP	(0.02)	(0.036)	(0.022)	(0.042)	(0.02)	(0.033)
Real per capita GDP	0.01***	0.02***	0.02***	0.03***	0.02***	0.03***
GDP per capita (constant 2005 USD), logs	(0.004)	(0.007)	(0.005)	(0.009)	(0.004)	(0.008)
Inflation	-0.011	-0.027	0.004	0.006	0.001	-0.01
Percentage change of CPI	(0.01)	(0.027)	(0.012)	(0.023)	(0.01)	(0.027)
Government expenditure	-1.23*	-1.37*	-1.11***	-1.38	-1.57**	-2.46***
Government expenditure (% of GDP), in logs	(0.706)	(1.36)	(0.69)	(1.384)	(0.616)	(1.114)
Government debt	-1.32**	-2.77**	-1.18***	-2.51***	-1.58***	-3.02***
Government debt (% of GDP), in logs	(0.522)	(1.093)	(0.366)	(0.779)	(0.383)	(0.76)
Current account balance	-0.03	-0.05***	-0.02**	-0.04**	-0.007	-0.01
Current account balance (% of GDP), in logs	(0.019)	(0.037)	(0.016)	(0.031)	(0.02)	(0.031)
Reserves	0.058	0.209	-0.051	-0.142	-0.105	-0.123
Reserves (% of GDP), in logs	(0.182)	(0.35)	(0.173)	(0.338)	(0.17)	(0.348)
Default	-1.36***	-2.31**	-0.304	-0.557	-0.412	-0.735
Dummy of sovereign default	(0.418)	(0.953)	(0.415)	(0.852)	(0.482)	(1.03)
Number of countries	70	70	69	69	66	66
Time period	2003-2020	2003-2020	2003-2020	2003-2020	2003-2020	2003-2020
Negative log-likelihood	1698	1679	1672	1651	1513	1489

Notes: Robust standard errors in parentheses. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. RE stands for random-effects.

Table 4 shows the regressions for each credit rating agency, taking into account each of the six components of political institutions instead of the aggregate variable. Overall, the results are similar to the previous ones: the institutional components have a significant and positive relationship with the credit rating, while uncertainty itself and its interaction with each institutional component have a negative sign. However, there are few cases in which the expected overall result is not observed.

Control of corruption measures the perception of the degree to which public power is exercised for private gain, as well as the “capture” of the state by elites and private interests. Studies show that corruption has long-lasting effects on a country’s growth and investment (see Mauro, 1995; Mo, 2001, among others). Corruption forces innovators,

Table 4: Estimation results

Dependent variable: Sovereign credit rating	Moody's		Standard & Poor's		Fitch	
	RE Probit	RE Logit	RE Probit	RE Logit	RE Probit	RE Logit
Uncertainty	-1.15*** (0.33)	-1.83*** (0.57)	-1.26*** (0.34)	-2.02*** (0.62)	-1.25*** (0.28)	-2.06*** (0.51)
Institutions: Control of corruption	1.64*** (0.41)	2.70*** (0.79)	2.09*** (0.38)	3.61*** (0.78)	1.97*** (0.41)	3.33*** (0.80)
Uncertainty×Control of corruption	-0.75** (0.36)	-1.33** (0.66)	-0.96** (0.38)	-1.77** (0.72)	-0.72** (0.36)	-1.20* (0.65)
Negative log-likelihood	1756	1739	1718	1695	1573	1548
Uncertainty	-0.95** (0.38)	-1.49** (0.63)	-1.07*** (0.35)	-1.72*** (0.66)	-1.07*** (0.31)	-1.87*** (0.57)
Institutions: Government effectiveness	2.51*** (0.50)	4.59*** (0.99)	2.62*** (0.29)	4.54*** (0.94)	3.18*** (0.94)	5.73*** (0.99)
Uncertainty×Government effectiveness	0.66 (0.41)	-1.10** (0.72)	-1.14*** (0.42)	-2.17*** (0.80)	-0.57 (0.43)	-0.86 (0.75)
Negative log-likelihood	1729	1708	1708	1685	1528	1500
Uncertainty	-1.18*** (0.33)	-1.92*** (0.56)	-1.42*** (0.31)	-2.30*** (0.61)	-1.35*** (0.25)	-2.32*** (0.50)
Institutions : Rule of law	2.49*** (0.63)	4.63*** (1.307)	2.85*** (0.60)	5.05*** (1.20)	3.10*** (0.98)	5.44*** (0.98)
Uncertainty×Rule of law	-0.83** (0.38)	-1.39* (0.75)	-1.08*** (0.39)	-2.14*** (0.77)	-0.70* (0.71)	-1.15 (0.71)
Negative log-likelihood	1732	1712	1693	1671	1531	1506
Uncertainty	-0.94** (0.42)	-1.43* (0.75)	-1.11*** (0.40)	-1.62*** (0.75)	-1.09*** (0.38)	-1.73** (0.69)
Institutions: Regulatory quality	2.98*** (0.60)	5.77*** (1.25)	2.6*** (0.58)	4.84*** (0.23)	3.62*** (0.52)	6.62*** (1.02)
Uncertainty×Regulatory quality	-0.59 (0.44)	-1.06 (0.79)	-1.09** (0.44)	-2.21** (0.86)	-0.65 (0.46)	-1.07 (0.80)
Negative log-likelihood	1711	1685	1704	1678	1508	1480
Uncertainty	-0.20*** (0.32)	-1.96*** (0.55)	-1.54*** (0.37)	-2.56*** (0.70)	-1.46*** (0.28)	-2.44*** (0.74)
Institutions: Political stability	1.58*** (0.29)	2.66*** (0.54)	1.12*** (0.31)	1.87*** (0.55)	1.21*** (0.39)	2.11*** (0.74)
Uncertainty×Political stability	-1.10** (0.47)	-1.56* (0.81)	-0.92* (0.47)	-1.55* (0.80)	-0.83 (0.53)	-1.15 (0.90)
Negative log-likelihood	1729	1710	1740	1715	1580	1551
Uncertainty	-1.23*** (0.37)	-1.93*** (0.66)	-1.17*** (0.46)	-1.72** (0.81)	-1.32*** (0.83)	-2.08*** (0.79)
Institutions: Voice and accountability	0.78 (0.75)	1.36 (1.58)	1.92*** (0.45)	3.42*** (0.90)	0.70 (0.83)	1.41 (1.69)
Uncertainty×Voice and accountability	-0.75 (0.49)	-1.09 (0.874)	-1.23* (0.62)	-2.34** (1.07)	-0.78 (0.53)	-1.39 (1.02)
Negative log-likelihood	1777	1757	1734	1707	1607	1576
Macroeconomic control variables	✓	✓	✓	✓	✓	✓
Number of countries	70	70	69	69	66	66
Time period	2003-2020	2003-2020	2003-2020	2003-2020	2003-2020	2003-2020

Notes: Robust standard errors in parentheses. *, ** and *** denote statistical significance at the 10, 5 and 1% level, respectively. RE stands for random-effects.

who require licenses or permits, to pay high bribes to operate legitimate businesses. Investors who are not willing to pay the commissions have to exit the market, affecting growth and investment (see *Abu et al.*, 2015; *Mo*, 2001). In line with these studies, in our case corruption control is significant and positively affects credit ratings in all regressions. Furthermore, its interaction with uncertainty is negative and significant.

Political stability measures the perception of the likelihood of political instability, including terrorism. Empirical studies have found that it has a negative impact on the fiscal situation, investment, and economic growth, and leads to higher reliance on seigniorage and inflation. According to *Carmignani (2003)*, political instability causes uncertainty about the stability of political and economic institutions as well as the future course of economic policies, environment affecting agents' decisions to accumulate production factors. Our results support these arguments. In all cases, policy stability has a positive and significant effect on the credit rating. Likewise, its interaction with uncertainty is negative (except for Fitch).

Government effectiveness measures the perception of quality in public and civil service provision, as well as the degree of independence from political pressures. *Knack and Keefer (1995)* and *Poirson (1998)* found that bureaucratic quality affects investment. Moreover, *Feng (2002)* mentioned that uncertainty about government effectiveness can be more adverse than the policy itself, preventing private investors from committing their capital. If the government lacks consistency in the execution of its policies, investors will delay their investments until they are confident that the government is consistent in the execution of its policies. *Afonso et al. (2011)* noted that the effectiveness of the government has a long-run impact on credit ratings. Similarly, in this study, government effectiveness is significant and positive in all the regressions, and its interaction with uncertainty is significant and negative, except for Fitch.

Voice and accountability measures the perception of democracy in a country, as well as freedom of expression, freedom of association, and a free media. Empirical studies have shown that political freedom promotes private investment and growth (*Helliwell, 1994*; *Pastor and Sung, 1995*). Moreover, a change toward democracy mitigates the negative effect of political instability on private investment (*Feng, 2002*). Our results show that voice and accountability and its interaction with uncertainty have the expected positive and negative effect, respectively; but for Moody's and Fitch the interaction does not appear to be significant.

Rule of law measures agents' confidence in the rules of society and their enforcement, particularly with regard to contracts, property rights, the police, and the courts. *Biglaiser and Staats (2012)* show that the rule of law, strong courts, and the protection

of property rights positively affect the sovereign credit ratings. Studies find that is variable are related to levels of investment and growth (see Poirson, 1998; Knack and Keefer, 1995, among others). Our findings corroborate these results, as a positive and significant relationship between rule of law and credit rating is found in all regressions, while its interaction with uncertainty is negative and significant as expected.

Finally, regulatory quality captures perceptions of the government’s ability to formulate and implement sound policies and regulations that encourage private sector development. Boumparis *et al.* (2017) consider a regulatory quality index that is composed, among others, of financial institutions and find a positive effect on credit rating. This variable is statistically significant and positive in all the cases, and its interaction with uncertainty appears to be negative and significant only for Standard & Poor’s.

4. Conclusion

This paper studied the role of institutions and uncertainty in determining sovereign credit ratings. Using a sample of 74 countries from 2003 to 2020 of the three most important agencies—Moody’s, Standard & Poor’s, and Fitch—we found that institutions positively affect the sovereign credit rating whilst uncertainty impacts negatively. More importantly, we found that the negative effect of uncertainty can be mitigated by strengthening institutions, as their interaction is consistently negative.

When the analysis is performed using each of the six components of the political institutions instead of the aggregate institutional variable, we found that, in general, the results are quite similar to the baseline case. We also discovered that the results of the baseline scenario are driven mainly by the control of corruption and political stability components, and to a lesser extent by those of government effectiveness and regulatory quality.

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